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State Air Program

Pacific Ethanol, Inc.

September 29, 2008

Dan Pitman
Idaho Department of Environmental Quality
Air Pollution Control Division
1410 N. Hilton
Boise, ID 83706

Subject: Air Permit Revision for Pacific Ethanol Magic Valley, LLC
Burley, Idaho

Dear Mr. Pitman;

Pacific Ethanol, Inc. submits this Authority to Construct permit amendment for Pacific Ethanol Magic Valley, LLC (Facility), permit number P-2008.0025. The following submittal summarizes the proposed changes to the facility supported by the attachments. The facility will remain a synethetic minor source with respect to both Title V permitting and New Source Review.

Distillation Scrubber Stack Eliminated
The distillation scrubber (CE08) will no longer vent to atmosphere from stack SV13, but will be routed to the RTO (SV12).

SV13 Distillation Scrubber Stack

Species	VOC (tpy)	Acetaldehyde (tpy)	Formaldehyde (tpy)
Past Limited Emissions	2.32	2.1	0.0010
Proposed Limited Emissions	0	0.00	0.00
Net change in Emissions	-2.32	-2.10	0.00

Regenerative Catalytic Oxidizer Converted to Conventional RTO
The Facility proposes to replace the currently permitted SV12 Regenerative Catalytic Oxidizer (RCO) with a Regenerative Thermal Oxidizer (RTO). Physically, this only consists of removing the catalytic packing in the existing unit and increasing the

OFFICE: 916.403.2123
400 CAPITOL MALL, STE 2060
SACRAMENTO, CA 95814
www.pacificethanol.net

temperature. The Facility proposes to continuously monitor combustion temperature in order to demonstrate compliance.

Speciated emissions at the RTO have been revised based on emissions testing and our review of a broader dataset of compliance data from similar units. Stack parameter including height and flow rate have been adjusted based on as-built information.

Please note that the stack orientation is at a 45 degree angle. This has been accounted by adjusting the flow rate found in testing to account for only the vertical component of the exit velocity as calculated below.

$$14068.77 \text{ ACFM} * \text{SIN}(45) = 9948.12 \text{ ACFM}$$

SV12 RTO Stack

Species	VOC (tpy)	Acetaldehyde (tpy)	Formaldehyde (tpy)
Past Limited Emissions	20.31	2.25	0.0057
Proposed Limited Emissions	22.63	1.24	0.197
Net change in Emissions	2.32	-1.01	0.191

New Operation: Grain Grinding and Loadout

The Facility proposes to incorportate grain grinding and grain loadout into operations. Therefore, grain throughputs and fugitive emissions will increase. No new point sources of emissions are associated and no change to allowed emissions at existing point sources is necessary.

New Control Device: Ethanol Loadout Flare

The facility has decided to install a separate loadout flare to control emissions from the truck and rail loadout operations rather than route this source to the RTO. Control at the new device will be equivalent to control at the RTO unit, but the facility does not wish to reduce allowed emissions at the RTO therefore this leads to a net increase in emissions.

SV14 Loadout Flare

Species	VOC (tpy)	NOx (tpy)	CO (tpy)
Past Limited Emissions	---	---	---
Proposed Limited Emissions	4.20	2.43	4.06
Net change in Emissions	4.20	2.43	4.06

Facility-wide Emissions Change

Table 1 illustrates the predicted increase in emissions from proposed modifications at the Facility.

Table 1: Summary of Net Emissions Change Due to Proposed Modification

Total Emissions	PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	SO_2 (tpy)	NO_x (tpy)	VOC (tpy)	CO (tpy)	HAPS (tpy)
Past Limited Emissions	39.57	22.86	20.45	0.6	50.98	35.25	33.69	7.73
Proposed Limited Emissions	47.66	24.50	21.13	0.60	53.41	39.45	37.75	4.82
Net change in Emissions	8.09	1.64	0.68	0.00	2.43	4.20	4.06	-2.91

Toxic Air Pollutant (TAP) Emission Rates Used for Air Impact Modeling

As illustrated in Table 2, arsenic, benzene, cadmium, nickel, formaldehyde, and acetaldehyde exceed the screening emission limits (ELs) given in IDAPA 58.01.01.585 and IDAPA 58.01.01.586. TAP modeling has been conducted to show facility compliance. The air dispersion analysis can be found in Attachment A.

Table 2: TAP Emission Rates Used for Air Impact Modeling

Total Emissions	As (lb/hr)	Ben (lb/hr)	Cd (lb/hr)	Ni (lb/hr)	Form (lb/hr)	Acetal (lb/hr)
Screening ELs	1.50E-6	8.0E-4	3.70E-6	2.7E-5	5.10E-4	3.00e-3
Proposed TAP Emission Rates	4.56E-5	3.38E-2	2.51E-4	4.79E-4	7.34E-2	2.90E-1

The revised emission calculations are included as Attachment B, and the applicable Idaho Department of Environmental Quality forms can be found in Attachment C.

If you have any questions or comments, please feel free to contact me at the number listed below or Bill VonSee of Natural Resource Group, LLC at (612) 339-2478.

Based on information and belief formed after reasonable inquiry, the statements and information in the attached documents are true, accurate, and complete.

Sincerely,

Cheryl Pagard

Cheryl Pagard
Director of Permitting and Compliance
(916) 403-2129

Enclosures: As noted

Attachment A
Air Dispersion Analysis

AIR DISPERSION MODELING ANALYSIS

Pacific Ethanol Magic Valley, LLC
Burley, Idaho

Prepared for:
Pacific Ethanol, Inc.
400 Capitol Mall
Suite 2060
Sacramento, CA 95814

Prepared by:
Natural Resource Group, LLC
1000 IDS Center
80 South Eighth Street
Minneapolis, MN 55402

September 2008

Project No. PAC2007-091.06.330

Air Dispersion Modeling Analysis

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September 2008

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EXECUTIVE SUMMARY

Natural Resource Group, LLC (NRG) has performed an air dispersion modeling analysis for the Pacific Ethanol Magic Valley, LLC (Facitliy) facility located in Burley, Idaho, using the United States Environmental Protection Agency's (USEPA's) AMS/EPA Regulatory Model (AERMOD). AERMOD is a steady-state Gaussian plume model recommended by the USEPA for assessing pollutant impacts from facilities with emission points influenced by building downwash, such as the Magic Valley ethanol plant. This dispersion modeling analysis is required as part of the amendment to Application for the Authority to Construct submitted September 2008 to the Idaho Department of Environmental Quality (IDEQ).

In accordance with Idaho Department of Environmental Quality (IDEQ)'s State of Idaho Air Quality Modeling Guideline (the Guideline) dated December 31, 2002, the ambient air impacts resulting from the proposed construction of the Facility's ethanol plant have been assessed for particulate matter less than 10 microns in diameter (PM_{10}), nitrogen oxides (NO_X), acetaldehyde, arsenic, benzene, cadmium, formaldehyde, and nickel. The results of the dispersion modeling analysis performed are summarized in the following table.

TABLE ES-1. SUMMARY OF DISPERSION MODELING ANALYSIS RESULTS

Pollutant	Averaging Period	Modeled Ambient Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	IDAPA AAC ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
PM_{10}	24-Hour	49.90	76	125.90	---	150
	Annual	7.59	27	34.59	---	50
NO_X	Annual	9.00	17	26	---	100
Acetaldehyde	Annual	0.34	---	---	0.45	---
Arsenic	Annual	0.00003	---	---	0.00023	---
Benzene	Annual	0.09756	---	---	0.12	---
Cadmium	Annual	0.00018	---	---	0.00056	---
Formaldehyde	Annual	0.073	---	---	0.077	---
Nickel	Annual	0.00034	---	---	0.0042	---

The results of this dispersion modeling analysis shown above indicate that the construction of the Facility will not cause or significantly contribute to a violation of the PM_{10} or NO_2 National Ambient Air Quality Standards (NAAQS) or Idaho Administrative Procedures Act (IDAPA)'s Acceptable Ambient Concentrations (AACs) of Toxic Air Pollutants (TAPs).

1.0 INTRODUCTION

Natural Resource Group, LLC (NRG) has performed a revised air dispersion modeling analysis for the Pacific Ethanol Magic Valley, LLC (Facility) facility located in Burley, Idaho, using the United States Environmental Protection Agency's (USEPA's) AMS/EPA Regulatory Model (AERMOD) model. AERMOD is a steady-state Gaussian plume model recommended by the USEPA for assessing pollutant impacts from facilities with emission points influenced by building downwash, such as the Magic Valley ethanol plant. This dispersion modeling analysis is required as part of a revision to the amendment application for the authority to construct submitted September 2008 to the Idaho Department of Environmental Quality (IDEQ).

Updated emission rates and stack dimensions are contained in Appendix A.

2.0 FACILITY EMISSIONS SOURCES

2.1 Potential Emissions

Air pollutant emissions from the facility are generated by material handling, fuel combustion, and ethanol production process operations. The primary pollutants emitted will be PM/PM_{10}, NO_x, SO_2, VOC, and CO. In addition, the Facility will emit toxic air pollutant (TAPs). A summary of the potential emissions from the proposed facility constructions and supporting emission calculations are included in the September 2008 amendment application for the authority to construct. Appendix A presents the emission rate of pollutants modeled in this analysis.

2.2 Source Types and Parameters

There are several types of emission sources that can be modeled in AERMOD. These source types include point sources, area sources, and volume sources. The majority of sources modeled are point sources, which consist of emission units that release all (or most) of their emissions out a stack or vent. Some sources, however, are much more complex and difficult to model using mathematical simulations. Fugitive sources such as the emissions from material handling operations do not typically have a single point of emission and are typically categorized as "pseudo" point, area, or volume sources. The Facility sources include conventional point and fugitive sources.

Each source of emissions has several parameters that are required for the dispersion modeling analysis. The parameters for the sources included in this analysis are presented in Appendix A. The facility plot plan is included in Appendix B.

3.0 MODELING METHODOLOGY

USEPA's AERMOD model was used to estimate the potential air quality impacts of the proposed ethanol facility. AERMOD is a steady-state Gaussian plume model recommended by the USEPA for assessing pollutant impacts from facilities with emission points influenced by building downwash, such as the Facility. When conducting a comprehensive NAAQS compliance demonstration, existing background air quality data is combined with modeled impacts and compared against the applicable standard.

3.1 Modeling Applicability

Dispersion modeling has been conducted to evaluate the potential impacts from the proposed facility's PM_{10} and NO_x emissions for comparison to the applicable short-term and annual significant contribution levels and NAAQS. For TAPs, dispersion modeling was performed to determine the potential impacts from the proposed facility's acetaldehyde, arsenic, benzene, cadmium, formaldehyde, and nickel emitted above Idaho Administrative Procedures Act (IDAPA) 58.01.01.585 and 586 screening emission levels (ELs) for comparison against their Acceptable Ambient Concentrations (AACs).

3.2 Significance Modeling

To determine whether emissions of a pollutant are required to be modeled for comparison with the ambient air standards (full impact analysis), it must be determined if the emissions have a significant impact on ambient air quality. Receptor grids used for determining significance are the same as those used in the refined modeling analysis (see Section 3.6). If the maximum modeled off-site concentration is greater than the significant contribution level (SCL), the source impact is considered significant and a full impact analysis (FIA) must be performed. The SCLs are listed below in Table 3.1.

TABLE 3-1. SIGNIFICANT CONTRIBUTION LEVELS

Pollutant	Significant Contribution Level (μg/m³)	
	24-Hour	Annual
PM_{10}	5	1
NO_X	---	1

For TAPs, the maximum modeled off-site concentration for the TAP is compared to its AAC for compliance determination. Table 3.2 lists the AACs for the modeled TAPs.

TABLE 3-2. ACCEPTABLE AMBIENT CONCENTRATIONS
Pacific Ethanol Magic Valley, LLC – Burley, Idaho

Toxic Air Pollutant	Acceptable Ambient Concentrations ($\mu g/m^3$)
Acetaldehyde	0.45
Arsenic	0.00023
Benzene	0.12
Cadmium	0.00056
Formaldehyde	0.077
Nickel	0.0042
Total PAHs	0.00034

3.3 Full Impact Analysis (FIA)

Pollutant emissions from a proposed facility or modification, which could have a significant impact on air quality, must be demonstrated to not cause or significantly contribute to a violation of the ambient air quality standards. For major PSD sources, the FIA must demonstrate compliance with the NAAQS and PSD increments. For non-PSD major sources, the FIA must demonstrate compliance with the NAAQS.

The NAAQS were established by the USEPA under the authority of the Clean Air Act. Primary NAAQS define levels of air quality that the USEPA deems necessary to protect public health. Secondary NAAQS define levels of air quality that the EPA judges necessary to protect public welfare from any known, or anticipated adverse effects of a pollutant. Examples of the public welfare that are protected by the secondary NAAQS include wildlife, buildings, national monuments, vegetation, visibility, and property values. The USEPA has NAAQS for the following criteria pollutants: PM_{10}, $PM_{2.5}$, NO_2, SO_2, CO, ozone, and lead. Table 3.3 lists the NAAQS as well as the compliance demonstration method for the pollutants included in this analysis.

TABLE 3-3. NATIONAL AMBIENT AIR QUALITY STANDARDS AND COMPLIANCE METHOD

Pollutant	Averaging Period	NAAQS ($\mu g/m^3$)	Compliance Method
PM_{10}	24-Hour	150	Highest 2nd Highest Ambient Concentration
	Annual	50	Highest Ambient Concentration
NO_2	Annual	100	Highest Ambient Concentration

3.4 Modeling Options

All regulatory default options are selected for the analysis.

Based on land use classifications from United States Geological Survey (USGS) topographical maps, the majority (*i.e.*, > 50%) of the land surrounding the proposed facility can be classified as suburban or rural. Therefore, the rural dispersion coefficients are used.[1] Elevated terrain is used in the modeling analysis to accurately account for the mild geographical terrain features surrounding the proposed site. The terrain elevations are established using digital elevation model (DEM) files from the USGS.

3.5 Ambient Air Boundary

The NAAQS and ambient air increments apply to air that is considered ambient. In accordance with the Guideline, ambient air is that portion of the atmosphere, external to buildings, to which the general public has access. In most cases, ambient air boundaries are delineated based on the location of a fence or other significant physical barrier that restricts public access. The proposed site will be fenced. As a result, the ambient air boundary for the facility was assumed to follow the fence line.

3.6 Receptor Grid

AERMOD model concentrations are estimated at discrete receptor locations. The discrete Cartesian receptor grid is designed to identify maximum predicted impacts due to the proposed facility. The following receptor systems were used in this analysis:

[1] Per 40 CFR 51 Appendix W *"Guideline on Air Quality Models"* Section 8.2.8, the urban/rural classification is determined based on the land use classification of the area that is circumscribed by a 3 kilometer radius about the source. If at least 50 percent of the land is commercial, heavy industrial, light-medium industry, close packed single family dwellings with no driveways, or older style, multi-family dwellings the urban dispersion coefficients may be used. Otherwise the default rural dispersion coefficients shall be used.

- A fenceline receptor grid with receptors placed along the fenceline at an interval distance of 25 meters;
- A tight Cartesian grid extending 200 meters from the site in every direction with receptors located at an interval distance of 25 meters;
- A fine Cartesian grid extending 500 meters from the site in every direction with receptors located at an interval distance of 50 meters;

More distant receptors were included in the original modeling. The receptor count has been reduced because it is clear that the maximum impacts from the facility occur within 500 meters and to speed model run time.

3.7 Meteorological Data

The dispersion modeling analysis was performed using AERMOD-ready meteorological data provided by the IDEQ.

3.8 Building Downwash

Emissions modeled from the Facility were evaluated to determine if the emissions plume may become entrained in turbulent wakes, thus resulting in potentially higher ambient air impacts. These wake effects, also known as downwash, are the result of air flowing around large buildings and structures creating areas, or "zones", of turbulent airflow.

The minimum stack height necessary to avoid downwash effects, known as Good Engineering Practice (GEP) stack height, is defined by the following equation.

$$H_{GEP} = H + 1.5L \qquad \text{(Equation 1)}$$

Where,

	H_{GEP}	=	GEP stack height
	H	=	structure or building height
	L	=	the lesser of the structure height or projected width

This equation applies only to stacks located within 5L of a downwash structure. Stacks located more than 5L from the downwash structure are not subject to the wake effects of that structure. If more than one stack at the facility is modeled, the equation must be successively applied to each stack. If more than one structure is modeled, the equation must also be successively applied to each structure. The building downwash determination for this modeling analysis is performed for each stack and structure using the USEPA-approved Building Profile Input Program (BPIPPRM) that is compatible with AERMOD. BPIPPRM will perform the aforementioned calculation for every 10-degree directional interval starting at 10 degrees and going clockwise to 360 (due North).

3.9 GEP Stack Height Determinations

As specified by the USEPA in Appendix W of 40 CFR 51 Section 7.2.5, no stack height credit may be given in excess of the GEP stack height for any source when determining emission limitations for compliance with the NAAQS and PSD increments. As defined in 40 CFR 51.100, GEP stack height is the greater of 65 meters or the height determined using the equation discussed in Section 3.9. The stack heights used for the dispersion modeling analysis are well below 65 meters. Therefore, the emission rates and stack heights used in the modeling analysis are appropriate for demonstrating compliance with the NAAQS.

4.0 DISPERSION MODELING RESULTS

4.1 Significance Modeling Results

The proposed PM_{10} and NO_X emissions were modeled and compared to the SCLs. Since the impacts from the Facility were predicted to be greater than the SCLs for PM_{10} and NO_X, a full impacts analysis was performed, which requires the addition of nearby sources identified by the IDEQ as significant sources of air contaminants.

The proposed acetaldehyde, arsenic, benzene, cadmium, formaldehyde, and nickel emissions were modeled and compared to their AACs since these TAPs emissions are above their ELs. The dispersion modeling indicated that the TAPs impacts are below the AACs, as shown in Appendix A. Therefore, the proposed construction of the Facility complies with the IDAPA's TAPs AACs.

4.2 Nearby Sources

Facilities that must demonstrate compliance with the NAAQS must also include any sources within 1,000 meters of the proposed site as indicated by IDEQ staff[2]. However, based on correspondence with IDEQ staff[3], no significant sources of PM_{10} and NO_X located near the Facility were identified; thus, there were no nearby sources included in the full impacts analysis.

4.3 Background Concentrations

The existing ambient air concentrations must be accounted for when demonstrating compliance with the NAAQS. The existing ambient air concentrations (often referred to as background concentrations) are often estimated using ambient air monitoring data from the air basin that the proposed site is located. This method of estimating the background concentration is conservative because it accounts for the existing air pollutant concentrations including existing stationary source impacts. Therefore, FIA that use the ambient air monitoring data as background concentrations and include nearby sources are double counting the configuration of actual emissions from existing facilities. For this modeling analysis, the background concentration is estimated based on information supplied to NRG by the IDEQ. The background concentrations used in this modeling analysis are shown in Table 4.1.

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[2] Per a October 20, 2006 email from Kevin Schilling, at IDEQ, to Warner Reeser, at Natural Resource Group, "Re: Burley Protocol."
[3] Per a October 23, 2006 email from Kevin Schilling, at IDEQ, to Warner Reeser, at Natural Resource Group, "Re: Burley Protocol."

TABLE 4-1. BACKGROUND CONCENTRATIONS FOR BURLEY, IDAHO

Pollutant	Averaging Period	Concentration ($\mu g/m^3$)
PM_{10}	24-Hour	76
	Annual	27
NO_X	Annual	17

4.4 NAAQS Analysis

As documented in the modeling results summary table (Appendix A), the total impacts of PM_{10} and NO_X, which includes the modeled impacts from the proposed Facility and existing background concentrations of the pollutants in the Burley, Idaho area, are below the applicable NAAQS for each averaging period. Therefore, the proposed project complies with the PM_{10} and NO_2 NAAQS.

5.0 MODELING RUNS AND OUTPUT

The AERMOD input, output, meteorological data, and BPIP files for the modeling analysis are included on the CD-ROM found in Appendix C.

Appendix A – Model Inputs and Results

Table A-1 Point Source Parameters

Source ID	Source Description	Easting (X) (m)	Northing (Y) (m)	Base Elevation (m)	Stack Height (ft)	Temperature (°F)	Exit Velocity (m/s)	Stack Diameter (ft)	
SV01	Corn Receiving Baghouse	268670.5	4711463	1275	65	-459.67	30.593	1.47014436	
SV02	Corn Handling Baghouse	268675.2	4711462	1275	65	-459.67	30.593	1.47014436	
SV03	Corn Bin #1	268681.4	4711486	1275	67	-459.67	2.109	1.12007874	
SV04	Corn Bin #2	268682.5	4711444	1275	67	-459.67	2.109	1.12007874	
SV05	Surge Bin Spot Filters	268683.6	4711465	1275	30	-459.67	0.586	1.5	
SV06	Hammermilling Baghouse	268804.6	4711415	1275	60	-459.67	6.612	3	
SV09	Boiler #1	268818.6	4711561	1275	45	309.992	11.505	3	
SV10	Boiler #2	268824	4711561	1275	45	309.992	11.505	3	
SV11	Boiler #3	268839.4	4711561	1275	45	309.992	11.505	3	
COOL1	Cooling Tower 1	268794	4711629	1275	34	69.998	5	19.6850394	
COOL2	Cooling Tower 2	268793.8	4711619	1275	34	69.998	5	19.6850394	
SV12	RTO	268852.1	4711560	1275	48.25	170.006	8.5084*	2.75	
SV13	Loadout Flare	268849.3	4711570	1275	25	800.006	4.599507	3	

* Exit Velocity is calculated as the vertical component of the true exit velocity. This stack is positioned at a 45 degree angle.

Table A-2 Point Source Emissions Source ID	Source Description	PMTEN (tpy)	NO2 (tpy)	ARSENIC (tpy)	ENZEN (tpy)	CADMIUM (tpy)	NICKEL (tpy)	FORMALDE (tpy)	CETALDE (tpy)
SV01	Corn Receiving Baghouse	3.75							
SV02	Corn Handling Baghouse	1.880001							
SV03	Corn Bin #1	0.15							
SV04	Corn Bin #2	0.15							
SV05	Surge Bin Spot Filters	0.079999							
SV06	Hammermilling Baghouse	1.689999							
SV09	Boiler #1	2.47	16.56	6.49E-05	7E-04	3.57E-04	0.000682	0.02429898	
SV10	Boiler #2	2.47	16.56	6.49E-05	7E-04	3.57E-04	0.000682	0.02429898	
SV11	Boiler #3	2.47	16.56	6.49E-05	7E-04	3.57E-04	0.000682	0.02429898	
COOL1	Cooling Tower 1	1.645							
COOL2	Cooling Tower 2	1.645							
SV12	RTO	0.2	1.31	5.15E-06	0.105	2.83E-05	5.41E-05	0.219	1.24
SV13	Loadout Flare		2.43		0.013				

Table A-3 Area Source Parameters and Emissions

Source ID	Source Description	Easting (X)	Northing (Y)	Base Elevation	Release Height	Easterly Length	Northerly Length	Angle from North	Vertical Dimension	BENZENE	FORMALDE	ACETALDE
		(m)	(m)	(m)	(ft)	(ft)	(ft)		(ft)	(tpy)	(tpy)	(tpy)
EQUIPFUG	Equipment Leaks	268735.34	4711428	1275	0.984252	179.9868766	329.98688	0	39.99344	0.00755		
TANKS	Tank Emissions	268679.81	4711565	1275	2.0013123	100	100	0	25	0.0202		
WETCAKE	Ridge Vent Emissions from Wetcake building	268751.94	4711382	1275	41	2.001312336	150	0	2.001312		0.0512	0.0256

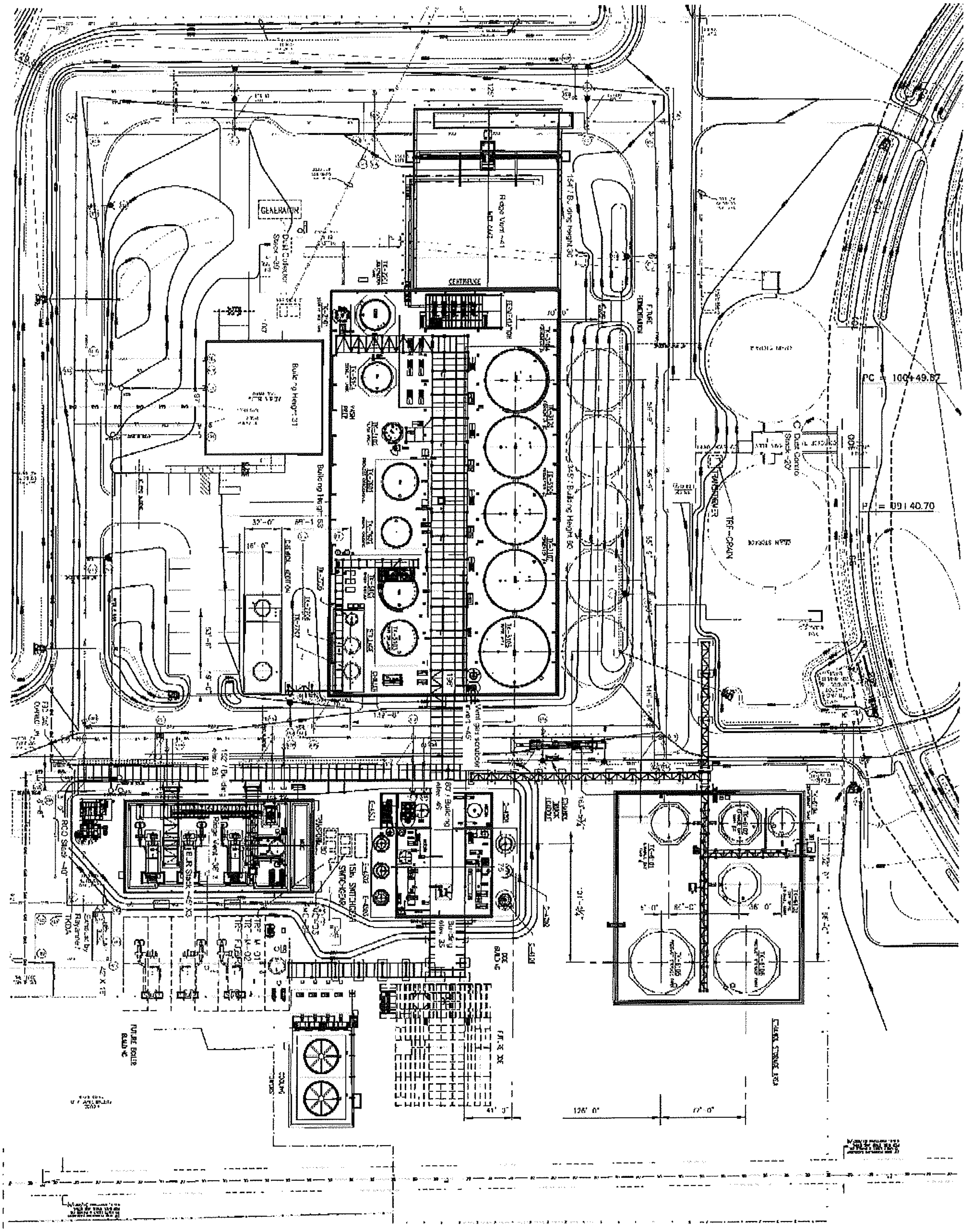
Table A-4 Volume Source Parameters and Emissions

Source ID	Source Description	Easting (X)	Northing (Y)	Base Elevation	Release Height	Horizontal Dimension	Vertical Dimension	PMTEN
		(m)	(m)	(m)	(ft)	(ft)	(ft)	(tpy)
GRAIN1	Grain Handling 1	268660.09	4711472	1275	7.5131234	5.577427822	7.5131234	0.973700001
GRAIN2	Grain Handling 2	268661.06	4711437	1275	7.5131234	5.577427822	7.5131234	0.973700001

Table A-5 Dispersion Modeling Results

Pollutant	Averaging Period	Modeled Ambient Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	IDAPA AAC ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
PM_{10}	24-Hour	49.9	76	125.9	---	150
	Annual	7.59	27	34.59	---	50
NO_X	Annual	9	17	26	---	100
Acetaldehyde	Annual	0.34	---	---	0.45	---
Arsenic	Annual	0.00003	---	---	0.00023	---
Benzene	Annual	0.09756	---	---	0.12	---
Cadmium	Annual	0.00018	---	---	0.00056	---
Formaldehyde	Annual	0.073	---	---	0.077	---
Nickel	Annual	0.00034	---	---	0.0042	---

Appendix B – Facility Plot Plan


GENERATOR
CENTRIFUGE
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Appendix C – Modeling Files (CD-ROM)

Attachment B
Revised Emission Calculations

Pacific Ethanol Magic Valley, LLC
Limited Potential Emissions @ 60 million gallons ethanol production

Stack/ Vent ID	Control Equipment ID	Emission Unit ID	Emission Sources Associated with Ethanol Operations	Criteria Pollutants (Limited Emissions)						
				PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	SO_2 (tpy)	NO_x (tpy)	VOC (tpy)	CO (tpy)
SV01	CE03	EU01	Truck Dump Pit	SV01	SV01	SV01	---	---	---	---
SV01	CE03	EU01	Rail Dump Pit	SV01	SV01	SV01	---	---	---	---
SV01	CE03	SV01	Corn Receiving Baghouse	3.75	3.75	3.75	---	---	---	---
SV02	CE02	EU03	Corn Conveyor #1	SV02	SV02	SV02	---	---	---	---
SV02	CE02	EU04	Corn Elevator #1	SV02	SV02	SV02	---	---	---	---
SV02	CE02	EU05	Corn Conveyor #2	SV02	SV02	SV02	---	---	---	---
SV02	CE02	EU06	Corn Elevator #2	SV02	SV02	SV02	---	---	---	---
SV02	CE02	EU07	Scalper	SV02	SV02	SV02	---	---	---	---
SV02	CE02	EU08	Corn Conveyor #3	SV02	SV02	SV02	---	---	---	---
SV02	CE02	SV02	Corn Handling Baghouse	1.88	1.88	1.88	---	---	---	---
SV03	CE03	EU09	Corn Bin #1	SV03	SV03	SV03	---	---	---	---
SV03	CE03	SV03	Corn Bin #1 Spot Filters	0.15	0.15	0.15	---	---	---	---
SV04	CE04	EU10	Corn Bin #2	SV04	SV04	SV04	---	---	---	---
SV04	CE04	SV04	Corn Bin #2 Spot Filters	0.15	0.15	0.15	---	---	---	---
SV04	CE05	EU11	Surge Bin	SV05	SV05	SV05	---	---	---	---
SV05	CE05	SV05	Surge Bin Spot Filters	0.08	0.08	0.08	---	---	---	---
SV06	CE06	EU12	Hammermill #1	SV06	SV06	SV06	---	---	---	---
SV06	CE06	EU13	Hammermill #2	SV06	SV06	SV06	---	---	---	---
SV06	CE06	EU14	Hammermill #3	SV06	SV06	SV06	---	---	---	---
SV06	CE06	SV06	Hammermilling Baghouse	1.69	1.69	1.69	---	---	---	---
SV12	CE09	EU17	Yeast Tank	---	---	---	---	---	SV12	---
SV12	CE07, CE09	EU18	Fermenter #1	---	---	---	---	---	SV12	---
SV12	CE07, CE09	EU19	Fermenter #2	---	---	---	---	---	SV12	---
SV12	CE07, CE09	EU20	Fermenter #3	---	---	---	---	---	SV12	---
SV12	CE07, CE09	EU21	Fermenter #4	---	---	---	---	---	SV12	---
SV12	CE07, CE09	EU22	Beerwell	---	---	---	---	---	SV12	---
SV12	CE07	SV12	Fermentation Scrubber	---	---	---	---	---	SV12	---
SV12	CE08, CE09	EU16	Liquefaction Tank	---	---	---	---	---	SV12	---
SV12	CE08, CE09	EU23	De-gas Vessel	---	---	---	---	---	SV12	---
SV12	CE08, CE09	EU15	Slurry Tank	---	---	---	---	---	SV12	---
SV12	CE08, CE09	EU24	Beer Stripper	---	---	---	---	---	SV12	---
SV12	CE08, CE09	EU25	Side Stripper	---	---	---	---	---	SV12	---
SV12	CE08, CE09	EU26	Rectifier Column	---	---	---	---	---	SV12	---
SV12	CE08, CE09	EU27	Molecular Sieve	---	---	---	---	---	SV12	---
SV12	CE08, CE09	EU28	200 Proof Condenser	---	---	---	---	---	SV12	---
SV12	CE08, CE09	EU29	Whole Stillage Tank	---	---	---	---	---	SV12	---
SV12	CE08, CE09	EU30	Process Condensate Tank	---	---	---	---	---	SV12	---
SV12	CE08, CE09	EU31	Evaporator	---	---	---	---	---	SV12	---
SV12	CE08, CE09	EU32	Centrifuge #1	---	---	---	---	---	SV12	---
SV12	CE08, CE09	EU33	Centrifuge #2	---	---	---	---	---	SV12	---
SV12	CE08, CE09	EU41	Centrifuge #3	---	---	---	---	---	SV12	---
SV12	CE08, CE09	EU42	Centrifuge #4	---	---	---	---	---	SV12	---
SV12	CE08, CE09	EU43	Centrifuge #5	---	---	---	---	---	SV12	---
SV12	CE08, CE09	EU34	Syrup Tank	---	---	---	---	---	SV12	---
SV12	CE08, CE09	EU35	Thin Stillage Tank	---	---	---	---	---	SV12	---
SV12	CE08, CE09	SV12	Vent Gas Scrubber	---	---	---	---	---	SV12	---
SV12	CE09	SV12	Oxidizer**	0.20	0.20	0.20	0.02	1.31	22.63	2.25
SV13	CE10	EU39	Ethanol Truck Loadout*	---	---	---	---	---	SV12	---
SV13	CE10	EU40	Ethanol Rail Loadout	---	---	---	---	---	SV12	---
SV13	CE10	EU41	Loadout Flare	neg.	neg.	neg.	neg.	2.43	4.20	4.06
SV09	---	EU36	Boiler #1	2.47	2.47	2.47	0.19	16.56	1.78	10.48
SV10	---	EU37	Boiler #2	2.47	2.47	2.47	0.19	16.56	1.78	10.48
SV11	---	EU38	Boiler #3	2.47	2.47	2.47	0.19	16.56	1.78	10.48
---	---	TK01	190 Proof Tank	---	---	---	---	---	0.05	---
---	---	TK02	Denaturant Tank	---	---	---	---	---	0.79	---
---	---	TK03	200 Proof Storage Tank	---	---	---	---	---	0.19	---
---		TK04	200 Proof Storage Tank	---	---	---	---	---	0.19	---
---	---	TK05	Denatured Ethanol	---	---	---	---	---	0.17	---
		TK06	Denatured Ethanol	---	---	---	---	---	0.17	---
		TK07	Sulfuric Acid Storage Tank	---	---	---	---	---	1.7E-10	---
		TK08	Ammonia Storage Tank	---	---	---	---	---	3.7E-03	---
---	---	FS01	Truck Traffic	20.33	3.97	0.60	---	---	---	---
---	---	FS02	Fugitive Emissions from Grain Handling	6.44	1.43	1.43	---	---	---	---
---	---	FS03	Fugitive Emissions from Wet Cake Storage Pile / Loadout	---	---	---	---	---	2.67	---
---	---	FS04	Equipment Leaks	---	---	---	---	---	3.02	---
---	---	FS05	Cooling Towers	3.29	3.29	3.29	---	---	----	---
---	---	FS06	Grain Loadout	1.15	0.26	0.26	---	---	---	---
---	---	FS07	Grain Flaking	1.15	0.26	0.26	---	---	----	---
TOTAL				47.68	24.50	21.13	0.60	53.41	39.45	37.75

* Ethanol Loadout is assumed to be 100% truck loadout for most conservative value.

**The oxidizer controls emissions from the fermentation scrubber, and distillation scrubber.

Pacific Ethanol Magic Valley, LLC
Hazardous Air Pollutant Summary

Pollutant	Boiler #1 (tpy)	Boiler #2 (tpy)	Boiler #3 (tpy)	Loadout Flare (tpy)	Oxidizer* (tpy)	Tanks (tpy)	Wetcake (tpy)	Equipment Leaks (tpy)	Total (lb/hr)	Total (tpy)
2-Methylnaphthalene	7.79E-06	7.79E-06	7.79E-06	---	6.18E-07	---	---	---	5.48E-06	2.40E-05
3-Methylchloranthrene	5.84E-07	5.84E-07	5.84E-07	---	4.64E-08	---	---	---	4.11E-07	1.80E-06
7,12-Dimethylbenz(a)anthracene	5.19E-06	5.84E-07	5.19E-06	---	4.12E-07	---	---	---	2.60E-06	1.14E-05
Acenaphthene	5.84E-07	5.84E-07	5.84E-07	---	4.64E-08	---	---	---	4.11E-07	1.80E-06
Acenaphthlyene	5.84E-07	5.84E-07	5.84E-07	---	4.64E-08	---	---	---	4.11E-07	1.80E-06
Acetaldehyde	---	---	---	---	1.24E+00	---	2.56E-02	6.04E-04	2.89E-01	1.27E+00
Acrolein	---	---	---	---	2.64E-01	---	4.22E-03	---	6.13E-02	2.69E-01
Anthracene	7.79E-07	7.79E-07	7.79E-07	---	6.18E-08	---	---	---	5.48E-07	2.40E-06
Arsenic	6.49E-05	6.49E-05	6.49E-05	---	5.15E-06	---	---	---	4.56E-05	2.00E-04
Benzo(a)anthracene	5.84E-07	5.84E-07	5.84E-07	---	4.64E-08	---	---	---	4.11E-07	1.80E-06
Benzene	6.82E-04	6.82E-04	6.82E-04	1.29E-02	1.05E-01	2.02E-02	---	7.55E-03	3.38E-02	1.48E-01
Benzo(a)pyrene	3.90E-07	3.90E-07	3.90E-07	---	3.09E-08	---	---	---	2.74E-07	1.20E-06
Benzo(b)fluoranthene	5.84E-07	5.84E-07	5.84E-07	---	4.64E-08	---	---	---	4.11E-07	1.80E-06
Benzo(g,h,i)perylene	3.90E-07	3.90E-07	3.90E-07	---	3.09E-08	---	---	---	2.74E-07	1.20E-06
Benzo(k)fluoranthene	5.84E-07	5.84E-07	5.84E-07	---	4.64E-08	---	---	---	4.11E-07	1.80E-06
Beryllium	3.90E-06	3.90E-06	3.90E-06	---	3.09E-07	---	---	---	2.74E-06	1.20E-05
Cadmium	3.57E-04	3.57E-04	3.57E-04	---	2.83E-05	---	---	---	2.51E-04	1.10E-03
Carbon Disulfide	---	---	---	---	1.05E-04	4.05E-04	---	6.04E-05	1.30E-04	5.70E-04
Chromium	4.54E-04	4.54E-04	4.54E-04	---	3.61E-05	---	---	---	3.20E-04	1.40E-03
Chrysene	5.84E-07	5.84E-07	5.84E-07	---	4.64E-08	---	---	---	4.11E-07	1.80E-06
Cobalt	2.73E-05	2.73E-05	2.73E-05	---	2.16E-06	---	---	---	1.92E-05	8.40E-05
Cumene	---	---	---	---	2.10E-04	8.09E-05	---	3.02E-03	7.56E-04	3.31E-03
Dibenzo(a,h)anthracene	3.90E-07	3.90E-07	3.90E-07	---	3.09E-08	---	---	---	2.74E-07	1.20E-06
Dichlorobenzene	3.90E-04	3.90E-04	3.90E-04	---	3.09E-05	---	---	---	2.74E-04	1.20E-03
Ethyl benzene	---	---	---	1.23E-03	3.15E-02	1.21E-02	---	1.51E-04	1.03E-02	4.50E-02
Fluoranthene	9.74E-07	9.74E-07	9.74E-07	---	7.73E-08	---	---	---	6.85E-07	3.00E-06
Fluorene	9.09E-07	9.09E-07	9.09E-07	---	7.21E-08	---	---	---	6.39E-07	2.80E-06
Formaldehyde	2.43E-02	2.43E-02	2.43E-02	---	2.19E-01	---	5.12E-02	---	7.84E-02	3.43E-01
Formic Acid	---	---	---	---	3.53E-01	---	---	---	8.06E-02	3.53E-01
Hexane	5.84E-01	5.84E-01	5.84E-01	5.41E-02	7.79E-02	1.21E-02	---	1.51E-01	4.68E-01	2.05E+00
Indeno(1,2,3-cd)pyrene	5.84E-07	5.84E-07	5.84E-07	---	4.64E-08	---	---	---	4.11E-07	1.80E-06
Manganese	1.23E-04	1.23E-04	1.23E-04	---	9.79E-06	---	---	---	8.67E-05	3.80E-04
Mercury	8.44E-05	8.44E-05	8.44E-05	---	6.70E-06	---	---	---	5.93E-05	2.60E-04
Methanol	---	---	---	---	7.21E-02	---	3.20E-02	6.04E-04	2.39E-02	1.05E-01
Naphthalene	1.98E-04	1.98E-04	1.98E-04	---	1.57E-05	---	---	---	1.39E-04	6.10E-04
Nickel	6.82E-04	6.82E-04	6.82E-04	---	5.41E-05	---	---	---	4.79E-04	2.10E-03
Phenanathrene	5.52E-06	5.52E-06	5.52E-06	---	4.38E-07	---	---	---	3.88E-06	1.70E-05
Pyrene	1.62E-06	1.62E-06	1.62E-06	---	1.29E-07	---	---	---	1.14E-06	5.00E-06
Selenium	7.79E-06	7.79E-06	7.79E-06	---	6.18E-07	---	---	---	5.48E-06	2.40E-05
Toluene	1.10E-03	1.10E-03	1.10E-03	4.50E-03	1.05E-01	4.05E-02	---	1.51E-02	3.85E-02	1.69E-01
Xylenes	---	---	---	6.06E-03	1.05E-01	4.86E-02	---	1.51E-03	3.68E-02	1.61E-01
Total	**0.61**	**0.61**	**0.61**	**0.08**	**2.57**	**0.13**	**0.11**	**0.18**	**1.12**	**4.92**

Boiler #1 ***Natural Gas***

Firing Capacity: 75.6 MMBTU/hr
Heat Value: 1,020 BTU/cf
Fuel Burning Capacity: 0.0741 MMCf/hr
Stack Gas Flow 15,678 dscfm

Pollutant	Emission Factor* (lb/MMBtu)	Emission Rate (lb/hr)	Max. Uncontrolled Emissions (tpy)
PM	7.45E-03	0.56	2.47
$PM_{10}/PM_{2.5}$	7.45E-03	0.56	2.47
SO_2	5.88E-04	0.04	0.19
NO_x**	5.00E-02	3.78	16.56
VOC	5.39E-03	0.41	1.78
CO***	3.23E-05	2.39	10.48

*Emission Factors from Fifth Edition AP-42, Section 1.4, "Natural Gas Combustion", 7/98.
**Based on manufacturer guarantee.
***Based on manufacturer estimated emissions of 50 ppm,v, given in lb/cf.

Boiler #3 ***Natural Gas***

Firing Capacity: 75.6 MMBTU/hr
Heat Value: 1,020 BTU/cf
Fuel Burning Capacity: 0.0741 MMCf/hr
Stack Gas Flow 15,678 dscfm

Pollutant	Emission Factor* (lb/MMBtu)	Emission Rate (lb/hr)	Max. Uncontrolled Emissions (tpy)
PM	7.45E-03	0.56	2.47
$PM_{10}/PM_{2.5}$	7.45E-03	0.56	2.47
SO_2	5.88E-04	0.04	0.19
NO_x**	5.00E-02	3.78	16.56
VOC	5.39E-03	0.41	1.78
CO***	3.23E-05	2.39	10.48

*Emission Factors from Fifth Edition AP-42, Section 1.4, "Natural Gas Combustion", 7/98.
** Based on manufacturer guarantee.
***Based on manufacturer estimated emissions of 50 ppm,v, given in lb/cf.

Boiler #2 ***Natural Gas***

Firing Capacity: 75.6 MMBTU/hr
Heat Value: 1,020 BTU/cf
Fuel Burning Capacity: 0.0741 MMCf/hr
Stack Gas Flow 15,678 dscfm

Pollutant	Emission Factor* (lb/MMBtu)	Emission Rate (lb/hr)	Max. Uncontrolled Emissions (tpy)
PM	7.45E-03	0.56	2.47
$PM_{10}/PM_{2.5}$	7.45E-03	0.56	2.47
SO_2	5.88E-04	0.04	0.19
NO_x**	5.00E-02	3.78	16.56
VOC	5.39E-03	0.41	1.78
CO***	3.23E-05	2.39	10.48

*Emission Factors from Fifth Edition AP-42, Section 1.4, "Natural Gas Combustion", 7/98.
**Based on manufacturer guarantee.
***Based on manufacturer estimated emissions of 50 ppm,v, given in lb/cf.

HAP Calculations

		Boiler #1		***Boiler #2***		***Boiler #3***	
Pollutant	Emission Factor* (lb/MMBtu)	Potential Emissions (lb/hr)	(tpy)	Potential Emissions (lb/hr)	(tpy)	Potential Emissions (lb/hr)	(tpy)
2-Methylnaphthalene	2.35E-08	1.8E-06	7.8E-06	1.8E-06	7.8E-06	1.8E-06	7.8E-06
3-Methylchloranthrene	1.76E-09	1.3E-07	5.8E-07	1.3E-07	5.8E-07	1.3E-07	5.8E-07
7,12-Dimethylbenz(a)anthracene	1.57E-08	1.2E-06	5.2E-06	1.2E-06	5.2E-06	1.2E-06	5.2E-06
Acenaphthene	1.76E-09	1.3E-07	5.8E-07	1.3E-07	5.8E-07	1.3E-07	5.8E-07
Acenaphthlyene	1.76E-09	1.3E-07	5.8E-07	1.3E-07	5.8E-07	1.3E-07	5.8E-07
Anthracene	2.35E-09	1.8E-07	7.8E-07	1.8E-07	7.8E-07	1.8E-07	7.8E-07
Arsenic	1.96E-07	1.5E-05	6.5E-05	1.5E-05	6.5E-05	1.5E-05	6.5E-05
Benzo(a)anthracene	1.76E-09	1.3E-07	5.8E-07	1.3E-07	5.8E-07	1.3E-07	5.8E-07
Benzene	2.06E-06	1.6E-04	6.8E-04	1.6E-04	6.8E-04	1.6E-04	6.8E-04
Benzo(a)pyrene	1.18E-09	8.9E-08	3.9E-07	8.9E-08	3.9E-07	8.9E-08	3.9E-07
Benzo(b)fluoranthene	1.76E-09	1.3E-07	5.8E-07	1.3E-07	5.8E-07	1.3E-07	5.8E-07
Benzo(g,h,l)perylene	1.18E-09	8.9E-08	3.9E-07	8.9E-08	3.9E-07	8.9E-08	3.9E-07
Benzo(k)fluoranthene	1.76E-09	1.3E-07	5.8E-07	1.3E-07	5.8E-07	1.3E-07	5.8E-07
Beryllium	1.18E-08	8.9E-07	3.9E-06	8.9E-07	3.9E-06	8.9E-07	3.9E-06
Cadmium	1.08E-06	8.2E-05	3.6E-04	8.2E-05	3.6E-04	8.2E-05	3.6E-04
Chromium	1.37E-06	1.0E-04	4.5E-04	1.0E-04	4.5E-04	1.0E-04	4.5E-04
Chrysene	1.76E-09	1.3E-07	5.8E-07	1.3E-07	5.8E-07	1.3E-07	5.8E-07
Cobalt	8.24E-08	6.2E-06	2.7E-05	6.2E-06	2.7E-05	6.2E-06	2.7E-05
Dibenzo(a,h)anthracene	1.18E-09	8.9E-08	3.9E-07	8.9E-08	3.9E-07	8.9E-08	3.9E-07
Dichlorobenzene	1.18E-06	8.9E-05	3.9E-04	8.9E-05	3.9E-04	8.9E-05	3.9E-04
Fluoranthene	2.94E-09	2.2E-07	9.7E-07	2.2E-07	9.7E-07	2.2E-07	9.7E-07
Fluorene	2.75E-09	2.1E-07	9.1E-07	2.1E-07	9.1E-07	2.1E-07	9.1E-07
Formaldehyde	7.35E-05	5.6E-03	2.4E-02	5.6E-03	2.4E-02	5.6E-03	2.4E-02
Hexane	1.76E-03	1.3E-01	5.8E-01	1.3E-01	5.8E-01	1.3E-01	5.8E-01
Indeno(1,2,3-cd)pyrene	1.76E-09	1.3E-07	5.8E-07	1.3E-07	5.8E-07	1.3E-07	5.8E-07
Manganese	3.73E-07	2.8E-05	1.2E-04	2.8E-05	1.2E-04	2.8E-05	1.2E-04
Mercury	2.55E-07	1.9E-05	8.4E-05	1.9E-05	8.4E-05	1.9E-05	8.4E-05
Naphthalene	5.98E-07	4.5E-05	2.0E-04	4.5E-05	2.0E-04	4.5E-05	2.0E-04
Nickel	2.06E-06	1.6E-04	6.8E-04	1.6E-04	6.8E-04	1.6E-04	6.8E-04
Phenanathrene	1.67E-08	1.3E-06	5.5E-06	1.3E-06	5.5E-06	1.3E-06	5.5E-06
Pyrene	4.90E-09	3.7E-07	1.6E-06	3.7E-07	1.6E-06	3.7E-07	1.6E-06
Selenium	2.35E-08	1.8E-06	7.8E-06	1.8E-06	7.8E-06	1.8E-06	7.8E-06
Toluene	3.33E-06	2.5E-04	1.1E-03	2.5E-04	1.1E-03	2.5E-04	1.1E-03
Total		0.14	**0.61**	0.14	**0.61**	0.14	**0.61**

*Emission Factors from AP-42, 5th Edition, Section 1.4, "External Combustion Sources," 7/98

Pacific Ethanol Magic Valley, LLC
Grain Hammermilling Emission Calculations

Process Data

Grain Required for 60.00 MMgal EtOH:	22.5	MM bushels/yr =	
Grain Density:	56	lb/bushel	
Total Grain Receiving Throughput:	629,213	tpy =	71.8 ton/hr
	629,213		
Total Grain Loadout Throughput:	1,500	tons/day	
	547,500	tpy	62.5 ton/hr
Wet Cake:			140,289 lb/hr
Wet Cake Handling (32% solids):	140,289 lb/hr ÷ 2000 lb/ton =		70.1 ton/hr

Emission Calculation Method
Uncontrolled Potential Emissions = Flow Rate (DSCFM) · Emission Factor (gr/DSCF) ÷ 7,000 gr/lb · 60 min/hr

$PM/PM_{10}/PM_{2.5}$ Emissions from Grain Receiving, Handling, and Hammermilling

Stack ID	Emission Source	Flow Rate (DSCFM)	Emission Factor (gr/DSCF)	Controlled Emissions (lb/hr)	Controlled Emissions (tpy)
SV01	Corn Receiving Baghouse	20,000	0.005	0.86	3.75
SV02	Corn Handling Baghouse	10,000	0.005	0.43	1.88
SV03	Corn Bin #1 Spot Filters	400	0.01	0.03	0.15
SV04	Corn Bin #2 Spot Filters	400	0.01	0.03	0.15
SV05	Surge Bin Spot Filters	200	0.01	0.02	0.08
SV06	Hammermilling Baghouse	9,000	0.005	0.39	1.69

Emission Calculation Method
Uncontrolled Potential Emissions = Throughput (ton/hr) · Emission Factor (lb/ton) · 8,760 hr/yr · 1 ton/2000 lb

Fugitive PM Emissions from Grain Handling

Stack ID	Emission Source	Throughput (ton/hr)	AP-42* Emission Factor (lb/ton)	Uncontrolled PM Emissions (lb/hr)	Uncontrolled PM Emissions (tpy)	Capture Efficiency		Uncaptured PM Emissions (lb/hr)	Uncaptured PM Emissions (tpy)
FS02	Fugitive Emissions from Grain Handling	420.0	0.035	14.70	64.39	10%	uncaptured	1.47	6.44
FS06	Fugitive Emissions from Grain Loadout	75.0	0.035	2.63	11.50	10%	uncaptured	0.26	1.15
FS07	Fugitive Emissions from Grain Receiving for Flaking	75.0	0.035	2.63	11.50	10%	uncaptured	0.26	1.15

*Emission factors taken from AP-42 Section 9.9.1, 6/98.

Fugitive $PM_{10}/PM_{2.5}$ Emissions from Grain Handling

Stack ID	Emission Source	Throughput (ton/hr)	AP-42* Emission Factor (lb/ton)	Uncontrolled $PM_{10}/PM_{2.5}$ Emissions (lb/hr)	Uncontrolled $PM_{10}/PM_{2.5}$ Emissions (tpy)	Capture Efficiency		Uncaptured $PM_{10}/PM_{2.5}$ Emissions (lb/hr)	Uncaptured $PM_{10}/PM_{2.5}$ Emissions (tpy)
FS02	Fugitive Emissions from Grain Handling	420.0	0.0078	3.28	14.35	10%	uncaptured	0.33	1.43
FS06	Fugitive Emissions from Grain Loadout	75.0	0.0078	0.59	2.56	10%	uncaptured	0.06	0.26
FS07	Fugitive Emissions from Grain Receiving for Flaking	75.0	0.0078	0.59	2.56	10%	uncaptured	0.06	0.26

*Emission factors taken from AP-42 Section 9.9.1, 6/98.

Pacific Ethanol Magic Valley, LLC
Fermentation Process

Process Data
VOC and HAP emissions are controlled by the CO_2 scrubber and the Oxidizer.

Potential VOC Emissions

Control Unit	Scrubber/RTO
Estimated Total Control Efficiency	98.0%
Compiled stack test data:	
VOC as carbon (ppm,d)[1]	186.45
VOC as carbon (ppm,d) (Assuming additional 50% control from oxidizer)	93.22
Molecular weight of carbon	12
Mass VOC/ Mass Carbon ratio[1]	1.97
Non-condensable gas flow rate (dscfm) (based on stack test)	12,000
Potential Emissions:	
Controlled VOC as carbon emission rate	2.09 lb/hr
Uncontrolled Potential Emissions[2]	206.20 lb/hr
	903.17 ton/yr
Potential Emissions from CO_2 Scrubber	4.12 lb/hr
	18.06 tons/yr

[1] From compiled stack test data.
[2] Based on the 98% estimated control efficiency. Actual achieved efficiency should be 99%.

Potential HAP Emissions

HAP	Compiled Stack Test Concentration (ppm, d)	Molecular Weight	Additional Control[1] (%)	Controlled Emission Rate (lb/hr)	Controlled Emission Rate (ton/yr)
Formaldehyde[2]	0.4	60.05	0%	0.0422	0.185
Methanol[3]	0.5	56.06	75%	0.014	0.06
Acetaldehyde[3]	4.6	96.09	83%	0.145	0.64
Formic Acid[3]	1.9	46.03	50%	0.0797	0.3492
Acrolein (ND)[3]	0.1	46.03	50%	0.0046	0.0201
Total				**0.2860**	**1.2526**

[1] Additional control achieved by oxidizer
[2] Based on maximum measured concentration in stastical data set
[3] Based on compiled stack test data

Pacific Ethanol Magic Valley, LLC
Distillation Process

Process Data
Emissions controlled by the vent gas scrubber and Oxidizer

Potential VOC Emissions

Control Unit	Scrubber
Estimated Total Control Efficiency	98.0%
Compiled stack test data:	
VOC as carbon (ppm,d)[1]	379.66
Molecular weight of carbon	12
Mass VOC/ Mass Carbon ratio[1]	1.97
Non-condensable gas flow rate (dscfm) (based on stack test data)	380
Potential Emissions:	
Controlled VOC as carbon emission rate	0.27 lb/hr
Uncontrolled Potential Emissions[2]	26.51 lb/hr 116.12 ton/yr
Potential Emissions from Vent Gas Scrubber	0.53 lb/hr 2.32 tons/yr

[1] From compiled stack test data.
[2] Based on the 98% estimated control efficiency

Potential HAP Emissions

HAP	Compiled stack Test Concentration (ppm, d)	Molecular Weight	Safety factor[1]	Controlled Emission Rate (lb/hr)	Controlled Emission Rate (ton/yr)
Formaldehyde[2]	2.0	33.03	2.0	0.0078	0.034
Methanol[3]	0.4	32.04	3.0	0.0021	0.01
Acetaldehyde[3]	10.0	44.05	5.3	0.1380	0.60
Formic Acid[3]	0.3	46.03	1.0	0.0008	0.0037
Acrolein (ND)[3]	0.2	56.06	99.0	0.0558	0.2443
Total				**0.2045**	**0.8958**

[1] Formaldehyde safety factor is based on the range of measured concentrations in the stastical data set
[2] Based on maximum measured concentration in stastical data set
[3] Based on compiles stack test data

Pacific Ethanol Magic Valley, LLC
Oxidizer Combustion Calculations

	Oxidizer
Max Firing Capacity	6,000,000 BTU/hr
Usable Firing Capacity:	6,000,000 BTU/hr

Primary Fuel Type:	Natural Gas
Heat Value:	1,020 BTU/cf
Fuel Burning Capacity:	5,882 cf/hr

Pollutant	Emission Factor* (lb/MMBtu)	Emission Rate (lb/hr)	Max. Uncontrolled Emissions (tons/yr)
PM	0.00775	0.047	**0.20**
PM_{10}	0.00775	0.047	**0.20**
Sox	0.00059	0.0035	**0.02**
NO_x**	0.05000	0.300	**1.31**
VOC	0.00561	0.034	**0.15**
CO	0.08568	0.514	**2.25**

*Emission Factors from Fifth Edition AP-42, Section 1.4, "Natural Gas Combustion", 10/96.
**Emission Factor provided by manufacturer

Pacific Ethanol Magic Valley, LLC
Oxidizer HAP Calculations

HAP Emissions

Pollutant	Emission Factor* (lb/MMBtu)	Potential Emissions (lb/hr)	Potential Emissions (tpy)
2-Methylnaphthalene	2.35E-08	1.4E-07	6.2E-07
3-Methylchloranthrene	1.76E-09	1.1E-08	4.6E-08
7,12-Dimethylbenz(a)anthracene	1.57E-08	9.4E-08	4.1E-07
Acenaphthene	1.76E-09	1.1E-08	4.6E-08
Acenaphthlyene	1.76E-09	1.1E-08	4.6E-08
Anthracene	2.35E-09	1.4E-08	6.2E-08
Arsenic	1.98E-07	1.2E-06	5.2E-06
Benzo(a)anthracene	1.76E-09	1.1E-08	4.6E-08
Benzene	2.06E-06	1.2E-05	5.4E-05
Benzo(a)pyrene	1.18E-09	7.1E-09	3.1E-08
Benzo(b)fluoranthene	1.76E-09	1.1E-08	4.6E-08
Benzo(g,h,i)perylene	1.18E-09	7.1E-09	3.1E-08
Benzo(k)fluoranthene	1.76E-09	1.1E-08	4.6E-08
Beryllium	1.18E-08	7.1E-08	3.1E-07
Cadmium	1.08E-06	6.5E-06	2.8E-05
Chromium	1.37E-06	8.2E-06	3.6E-05
Chrysene	1.76E-09	1.1E-08	4.6E-08
Cobalt	8.24E-08	4.9E-07	2.2E-06
Dibenzo(a,h)anthracene	1.18E-09	7.1E-09	3.1E-08
Dichlorobenzene	1.18E-06	7.1E-06	3.1E-05
Fluoranthene	2.94E-09	1.8E-08	7.7E-08
Fluorene	2.75E-09	1.6E-08	7.2E-08
Formaldehyde	7.35E-05	4.4E-04	1.9E-03
Hexane	1.76E-03	1.1E-02	4.6E-02
Indeno(1,2,3-cd)pyrene	1.76E-09	1.1E-08	4.6E-08
Manganese	3.73E-07	2.2E-06	9.8E-06
Mercury	2.55E-07	1.5E-06	6.7E-06
Naphthalene	5.98E-07	3.6E-06	1.6E-05
Nickel	2.06E-06	1.2E-05	5.4E-05
Phenanathrene	1.67E-08	1.0E-07	4.4E-07
Pyrene	4.90E-09	2.9E-08	1.3E-07
Selenium	2.35E-08	1.4E-07	6.2E-07
Toluene	3.33E-06	2.0E-05	8.8E-05
Total			**0.05**

*Emission Factor is from AP-42, 5th Edition, Section 1.4, "External Combustion Sources," 7/98

Pacific Ethanol Magic Valley, LLC
Ethanol Loading Rack Emissions

From Fifth Edition AP-42, Section 5.2:

$$L = 12.46 \cdot S \cdot P \cdot M \div T$$

where:

L = Loading Loss, lb VOC/1000 gal of liquid loaded
S = Saturation Factor (AP-42 Table 5.2-1)
P = True Vapor Pressure of Liquid Loaded, psia
M = Molecular Weight of Vapors, lb/lb-mole
T = Temperature of Bulk Liquid Loaded, R

Ethanol Loadout PTE

	tpy
PM	neg.
SO2	neg.
NOx	2.43
VOC	4.20
CO	4.06

The values of P, T, and M are taken from the TANKS software which calculates the annual average bulk product temperature based on the annual average temperatures for the city of Pocatello, Idaho. The PTE is based on loading the maximum volume of ethanol that can be distilled by the facility plus denaturant at a concentration of 5 % by volume.

The submerged
loading rack on the
Facility Ethanol Production Loadout

Product	Annual Throughput (1000 gal)	Saturation Factor S	Vapor Molecular Weight MW	Product Temperature T (deg R)	True Vapor Pressure P (psia)	Loading Loss (lb/1000 gal)	Uncontrolled Loss (lb/hr)	Uncontrolled Loss (ton/yr)	Controlled Loss (lb/hr)	Controlled Loss (ton/yr)
Rail/Barge Loadout Denatured Ethanol	63,000	0.6	50.0449	506.04	0.5284	0.3907	2.81	12.31	0.06	0.25
Truck Loadout Gasoline	63,000	1	66	506.04	4.1037	6.6689	47.96	210.07	0.96	4.20
									Total* =	4.20

* PTE is based on the higher of the loadout scenarios (dedicated fleet vs. non-dedicated)

Combustion Related Criteria Pollutant Emissions

SO2 is negligible based on minimal H2S levels
PM/PM-10 is negligible based on smokeless design

Mex Annual Ethanol Loadout by Truck: 63,000 1,000 gal per year
Capture: 100 %

Emission Factors*	NOx	0.0770	lb/1000 gal loaded		
	CO	0.1290	lb/1000 gal loaded		
Emissions	NOx	0.55	lb/hr	2.43	ton/yr
	CO	0.93	lb/hr	4.06	ton/yr

* Emission Factors are based on MRW Technologies specifications.

Speciation of VOC Emissions

Speciated Emissions are Estimated Assuming that the VOC emitted has the same composition as Denatured Ethanol Vapor (From TANKS 4.09 output)

Toxics	CAS#	% of total	SV13 (tpy)	HAP?
n-Pentane	00-07-7			
Isopentane	00-07-7			
Heptane	00-07-7			
n-Octane	00-07-7			
Nonane	00-07-7			
Cyclopentane	00-07-7			
TOTAL	**00-07-7**	**14.14%**	**0.5941**	
n-Hexane	110-54-3	1.29%	0.0541	yes
Benzene	71-43-2	0.31%	0.0129	yes
Methylcyclohexane	108-87-2	0.21%	0.0090	
Cyclohexane	110-82-7	0.19%	0.0079	
Toluene	108-88-3	0.11%	0.0045	yes
Ethyl Benzene	100-41-4	0.029%	0.0012	yes
1,2,4-TrimethylBenzene	95-63-6	0.002%	0.0001	
Xylene	1330-20-7	0.14%	0.0061	yes
Ethanol	67-17-5	83.58%	3.5115	
TOTAL		**100%**	**4.20**	

Pacific Ethanol Magic Valley, LLC
Storage Tanks

Undenatured EtOH	60,000,000	gal/yr
Denaturant	3,000,000	gal/yr
Denatured EtOH	63,000,000	gal/yr
190 Proof	600,000	gal/yr

Tank	Contents	Throughput		Capacity	
TK01	190 Proof (1% of 60,000,000)	600,000	gal/yr	174,500	gallons
TK02	Denaturant	3,000,000	gal/yr	58,750	gallons
TK03	200 Proof Tank (50% of 60,000,000)	30,000,000	gal/yr	174,500	gallons
TK04	200 Proof Tank (50% of 60,000,000)	30,000,000	gal/yr	174,500	gallons
TK05	Denatured EtOH (50% of 63,000,00	31,500,000	gal/yr	587,000	gallons
TK06	Denatured EtOH (50% of 63,000,00	31,500,000	gal/yr	587,000	gallons

	TOTAL Ethanol Emissions (lb/yr) from Tanks 4.09	TOTAL gasoline emissions (lb/yr)	Gasoline (speciated) Cyclohexane 0.5% (lb/year)	Gasoline (speciated) Benzene 2.5% (lb/year)	Gasoline (speciated) Hexane 1.5% (lb/year)	Gasoline (speciated) Pentane 50% (lb/year)	Gasoline (speciated) NeoHexane 31.5% (lb/year)	Gasoline (speciated) Toluene 5% (lb/year)	Gasoline (speciated) Xylene 5% (lb/year)	Gasoline (speciated) Ethyl Benzene 1.5% (lb/year)	Gasoline (speciated) 1,2,4-Trimethyl benzene 2.5% (lb/year)	Carbon Disulfide 0.005% (lb/year)	Cumene 0.01% (lb/year)
Loadout		4201.39	21.01	105.03	63.02	2100.70	1323.44	210.07	210.07	63.02	105.03	0.21	0.42
TK01	108.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TK02	0.00	1584.81	7.92	39.62	23.77	792.41	499.22	79.24	79.24	23.77	39.62	0.08	0.16
TK03	380.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TK04	380.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TK05	288.89	51.63	. 0.26	1.29	0.77	25.82	16.26	2.58	2.58	0.77	1.29	0.00	0.01
TK06	288.89	51.63	0.26	1.29	0.77	25.82	16.26	2.58	2.58	0.77	1.29	0.00	0.01
TOTALS (lb/year)	1448.01	1688.07	8.44	42.20	25.32	844.04	531.74	84.40	84.40	25.32	42.20	0.08	0.17
TOTALS (ton/year)	**0.72**	**0.84**	**0.00**	**0.02**	**0.01**	**0.42**	**0.27**	**0.04**	**0.04**	**0.01**	**0.02**	**0.00**	**0.00**
TOTALS (lb/hr)	0.17	0.19	0.00	0.00	0.00	0.10	0.06	0.01	0.01	0.00	0.00	0.00	0.00

HAP Emissions from Storage Tanks

Pollutant	Emissions Source						
Storage Tanks	**TK001**	**TK002**	**TK003**	**TK004**	**TK005**	**TK006**	
VOC (lbs/yr)	108.57	1584.81	380.83	380.83	340.52	340.52	
VOC (tons/yr)	0.05	0.79	0.19	0.19	0.17	0.17	
HAP Fractions							
Benzene		2.50E-02			2.50E-02	2.50E-02	
Carbon Disulfide		5.00E-04			5.00E-04	5.00E-04	
Cumene		1.00E-04			1.00E-04	1.00E-04	
Ethylbenzene		1.50E-02			1.50E-02	1.50E-02	
n-Hexane		1.50E-02			1.50E-02	1.50E-02	
Toluene		5.00E-02			5.00E-02	5.00E-02	
Xylenes		5.00E-02			5.00E-02	5.00E-02	
HAP Emissions (tpy)							**Total**
Benzene		1.98E-02			2.13E-04	2.13E-04	2.02E-02
Carbon Disulfide		3.96E-04			4.26E-06	4.26E-06	4.05E-04
Cumene		7.92E-05			8.51E-07	8.51E-07	8.09E-05
Ethylbenzene		1.19E-02			1.28E-04	1.28E-04	1.21E-02
n-Hexane		1.19E-02			1.28E-04	1.28E-04	1.21E-02
Toluene		3.96E-02			4.26E-04	4.26E-04	4.05E-02
Xylenes		3.96E-02			8.51E-03	4.26E-04	4.86E-02
Total	**0.00E+00**	**1.23E-01**	**0.00E+00**		**9.41E-03**	**1.32E-03**	**1.34E-01**

Pacific Ethanol Magic Valley, LLC
Storage Tanks

PV=nRT

	TK07		TK08			
	H2SO4	H2O	NH3	H20		
Solution	96%	4%	30%	70%		
MW	98.07	18	17.03	18	g/mol	
V	122,500		649,000		gallons	
	16375.8681		86758.6806		ft3	
P			12.968	0.322	psia	
	3.81E-08	7.73E-07			bar	
	3.76E-08	7.63E-07	0.8824	0.0219	atm	At 78F
n	1.57E-06		194.993801		mol	
mass	1.54E-04		3320.74		grams	
	3.38E-07		7.31		pounds/yr*	
	1.69E-10		**3.65E-03**		tons/yr	

*pounds based on volume of saturated air displaced by tanker trucks.